

New Mapping Tool Helps Target Woody Encroachment



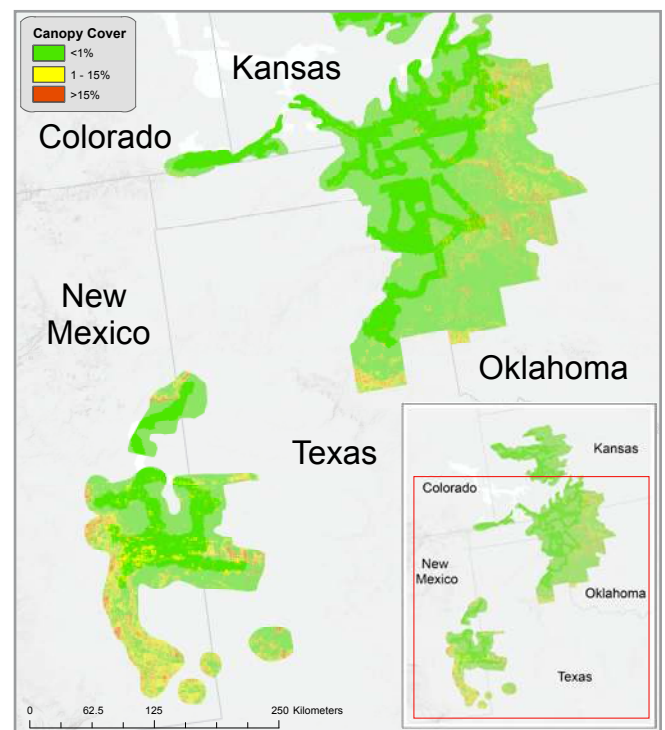
In Brief: Invasive woody plant expansion is a primary cause of fragmentation and loss of prairie habitats across the central and western United States. A new, high-resolution mapping tool helps range managers evaluate the landscape-level impacts of woody encroachment on lesser prairie-chicken habitat, target restoration actions, and monitor restoration outcomes.

Mapping Details Woody Invasion of Prairie Habitat

In the southern Great Plains, the expansion of eastern redcedar and honey mesquite into prairie grasslands has greatly altered these ecosystems, affecting food and water availability, predator dynamics, grassland structure and more (Miller et al. 2017). Redcedar canopy cover alone increased from 50% to 600% between 1965 to 1995 (Coppedge et al., 2001).

Wildfire suppression, historic periods of intensive livestock grazing, and changes in climate have all contributed to this woody encroachment (Miller et al. 2017). The spread of redcedar and mesquite has been linked to population declines in the lesser prairie-chicken (Fuhlendorf et al., 2002; Hunt and Best, 2010) and other grassland nesting birds (Coppedge et al., 2001). This type of habitat conversion is referred to as “top-down” threat as it converts and fragments prairie at broad scales (Miller et al. 2017).

A team of researchers from several partnering organizations¹ has developed a mapping tool to evaluate the threat of invasive woody plants on prairie grouse. The tool will help resource managers target habitat restoration and track restoration progress and outcomes within the lesser prairie-chicken’s active range in the southern Great Plains.



The research team’s map provides the first comprehensive geographical display of woody plant cover as a top-down threat to lesser prairie-chicken habitat.

¹ USDA Natural Resources Conservation Service, Colorado State University, The Nature Conservancy, University of Wyoming, University of Montana, Oregon State University, US Geological Survey, University of Minnesota, and New Mexico State University.

The researchers aimed to produce seamless regional mapping across political and administrative boundaries with a resolution fine enough to give a nuanced depiction of the extent and degree of woody plant invasion. The canopy cover maps produced through this research project provide the most geographically complete, high-resolution assessment to date of invasive woody plant cover in lesser prairie-chicken habitat.

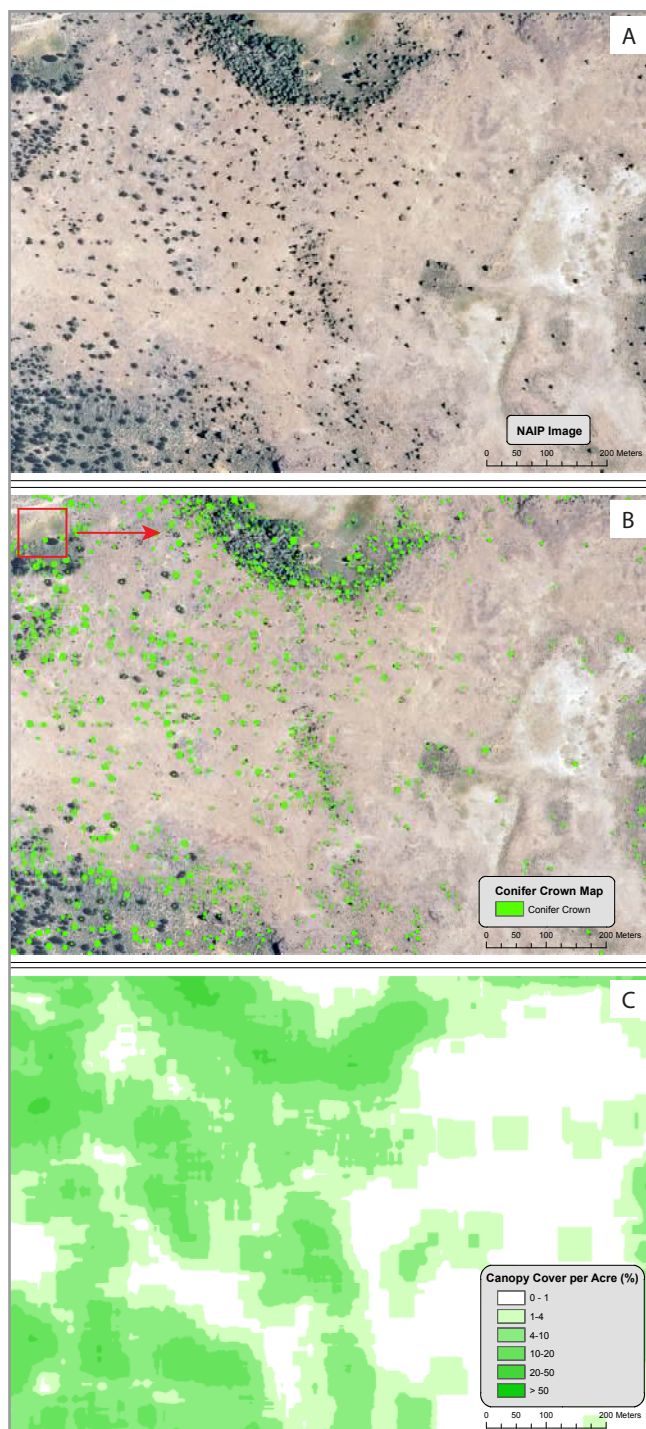


Redcedars grow extremely rapidly. In the absence of fire, open grasslands can convert to closed-canopy cedar woodland in just 40 years. Photo: Jeremy Roberts, Conservation Media.

Their resulting maps support the findings of field research showing a strong avoidance among lesser prairie-chickens of both redcedar (Lautenbach et al., 2017) and mesquite (Boggie et al., 2017)—the dominant invasive woody species in the southern Great Plains. Mapping in late 2016 showed that eastern redcedar was largely absent (having < 1% canopy cover) from more than 90% of occupied lesser prairie-chicken habitat. Mesquite was absent from more than 67% of occupied range. Lesser prairie-chickens rarely occurred in areas of higher canopy cover (>16 %) for either plant species.

Mapping Tool Identifies Restoration Priorities

Landscape-level mapping of invasive woody species is a crucial tool for supporting existing prairie habitat restoration efforts, including the U.S. Department of Agriculture Natural Resources Conservation Service's Lesser Prairie-Chicken Initiative (LPCI). To date, LPCI has invested more than \$1 million in prairie-chicken habitat conservation and, with partners, has conserved more than 166,000 acres of prairie through redcedar and mesquite removal.



Canopy cover mapping process first uses a National Agriculture Imagery Program image of an area experiencing redcedar encroachment (A) and then plots conifer locations and crown diameter (B) to produce the final canopy cover estimates for the area (C). The canopy cover mapping approach is similar for mesquite, but the location and crown areas are irregularly shaped polygons outlining mesquite canopies.



Mesquite encroachment is an issue in the southern part of the lesser prairie-chicken's range—western Texas and eastern New Mexico.
Photo: Jeremy Roberts, Conservation Media.

The newly developed mapping tool shows that redcedar and mesquite are not evenly distributed within the lesser prairie-chicken's range, but rather are regionally localized, with some areas relatively free of encroachment. The northeastern portions of the prairie-chicken's range (including southeastern Kansas and Oklahoma east of the panhandle) contain the greatest redcedar cover. Mesquite canopy cover estimates were mapped predominantly in the southern portions of the prairie-chicken's distribution in western Texas and eastern New Mexico and indicate that mesquite encroachment is a widespread problem over much of that region.

Implications for Range Management

Because lesser prairie-chickens strongly prefer sites with less than 1% mesquite canopy cover (Boggie et al., 2017) and less than one redcedar tree per acre (Lautenbach et al., 2017), the mapping tool's ability to assess woody plant abundance even at very low canopy-cover levels is a key attribute for range managers. The mapping tool also reveals tree-level detail from which range managers can accurately estimate canopy cover, tree density,

spatial canopy configuration, and crown size distributions. With the new mapping framework, range managers can prioritize areas where restoration practices—including prescribed fire, mechanical removal, and herbicide treatment—can achieve the greatest conservation return on investment. The mapping tool can identify areas where prescribed fire alone could address encroachment issues (areas of low-density redcedar encroachment), and areas that would likely require more intensive and costly means of restoration.

“The digital maps produced with this new mapping tool will help range managers balance trade-offs between costs and benefits of various treatment techniques across the landscape,” said lead researcher Michael Falkowski.

The high-resolution mapping tool is available at <http://kars.ku.edu/maps/sgpchat/>



Male lesser prairie-chickens spar on a lek in springtime. The new mapping tool helps range managers target woody plant removal at sites that support active leks. Photo: Nick Richter.

Range managers can also use this new mapping technology to show stakeholders that restoration goals are within reach; at \$40 per acre, careful targeting can eliminate low-density woody invasion (1-15% canopy cover) in prairie-chicken focal areas and connective zones (FACZs) for an estimated \$14 million—a relatively small investment to recover an imperiled species (Miller et al, 2016). High-resolution mapping offers a means to quantify and track threat reduction, increasing transparency and accountability for conservation funding.

Source

Falkowski, M.J., et al., Mapping tree canopy cover in support of proactive prairie grouse conservation in Western North America, 2017. *Rangeland Ecology & Management* 70, 15-24. <http://dx.doi.org/10.1016/j.rama.2016.08.002>.

Additional Resources

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Hunt, J.L. and T.L. Best, 2010. Vegetative characteristics of active and abandoned leks of lesser prairie-chickens (*Tympanuchus pallidicinctus*) in southeastern New Mexico. *Southwest Naturalist* 55, 477-487.

Lautenbach, J., R. Plumb, S. Robinson, D. Haukos, J. Pitman, and C. Hagen, 2017. Lesser prairie-chicken avoidance of trees in a grassland landscape. *Rangeland Ecology & Management* 70, 78-86.

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Learn More



The Lesser Prairie-Chicken Initiative, led by the USDA's Natural Resources Conservation Service, is a partnership-based, science-driven effort that uses voluntary incentives to proactively conserve America's western rangelands, wildlife, and rural way of life.

To learn more, visit www.lpcinitiative.org.